



**A BARREL FULL OF HOLES:  
A CASE STUDY OF  
PENNSYLVANIA REGULATIONS ON  
HIGH DENSITY LIVESTOCK FARM POLLUTION**

**Still Out of Balance:**

**A follow-up study of the health of the  
water and land of the Octoraro watershed**

**September 2009**



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## **Foreword**

In 2004, PennFuture published a report entitled, *A Barrel Full of Holes: A Case Study of Pennsylvania Regulations on High Density Livestock Farm Pollution*. The report assessed the total amount of manure produced and the corresponding nitrogen content of all manure, compliance status of agriculture operations, and manure use and transport patterns in the Octoraro watershed. The findings were less than impressive. A total of 59 percent of agriculture operations were in violation of their nutrient management plans. Determining the transport patterns of manure was impossible due to the absence of documents that identify where and how manure is land applied. The report concluded with a number of recommendations to address the shortcomings of the nutrient management program, including policy revisions. Implementation of some of the recommendations has since occurred.

Five years later, PennFuture takes a second look at the Octoraro watershed to assess whether or not the Nutrient Management Program and Concentrated Animal Feeding Operations (CAFO) permitting system are succeeding in reducing agricultural pollution in an agriculturally intensive watershed like the Octoraro. During this time, there has been much work put into cleanup efforts by state and local agencies and private organizations in the larger context of the Chesapeake Bay clean up. Even so, the report shows that a number of facilities have yet to come into full compliance with the regulatory programs, therefore, preventing meaningful reductions in agricultural pollution here in Pennsylvania and in the Chesapeake Bay. More disturbing, our review revealed that there has been a significant increase in the amount of manure and nutrients generated in the watershed. The Octoraro watershed may be one small portion of the 64,000 square mile Chesapeake Bay watershed, but the findings and recommendations of this report may have great significance throughout the region.

The Chesapeake Bay acts as a barometer indicating the quality of our local waterways. The health of the Bay doesn't start at the Maryland shoreline, but in the headwater states of Delaware, New York, West Virginia, and, of course, Pennsylvania. Half of the freshwater entering the Bay comes from Pennsylvania, meaning we play a huge part in the success or failure of our nation's largest estuary. *Clean water for the Chesapeake Bay starts here in the Susquehanna, Juniata, Conestoga, Loyalsock, and Octoraro.*

After 25 years of a cleanup program based on voluntary efforts, the Chesapeake Bay needs significant nutrient reductions more than ever before. Agriculture, urban and suburban runoff, poorly planned development, and wastewater are among the greatest threats to the quality of the Chesapeake Bay. Although we are all responsible for the quality of our ground and surface waters, agriculture is the single largest contributor of nutrients – nitrogen and phosphorus – to Pennsylvania's waterways, many of which ultimately lead to the Chesapeake Bay. Agriculture accounts for about 25 percent of the land use in the Bay region,

but is responsible for 42 percent of the nitrogen load and 48 percent of the phosphorus load delivered to the Bay each year, primarily due to animal manure spread on the land, and consequently running off into local waterways. An estimated 291 million pounds of nitrogen and 13.8 million pounds of phosphorus reached the Bay in 2008.<sup>1</sup>

By the end of 2011, the amount of nitrogen entering the Bay must be reduced by 15.8 million pounds and the amount of phosphorous must be reduced by 1.1 million pounds as part of a larger plan to clean up the Chesapeake Bay.<sup>2</sup> Pennsylvania has pledged to reduce nitrogen discharges to the Bay by 7.3 million pounds. This is equivalent to the amount of nitrogen generated annually by 797,814 people, or a city approximately 1.3 times as large as Washington, DC. The Commonwealth has also pledged to reduce phosphorous discharges by 300,000 pounds. This is equivalent to the amount of phosphorus generated annually by 218,978 people, or a city nearly five times as large as Harrisburg. This marks the first set of milestone reductions to put the Bay back on track to good health.

The Chesapeake Bay Program is a multi-state and federal partnership that has been coordinating the effort to clean the Bay for the last 22 years. Over the years, the Bay Program has set a series of pollution reduction goals that the states have failed to achieve. This past December, the governors of the Chesapeake Bay States admitted that they would fail again to meet a 2010 goal to reduce nutrient and sediment pollution to remove the Bay from the list of impaired waters. As a result, the Clean Water Act will now require the development of a massive cleanup plan, known as a Total Maximum Daily Load (TMDL), which will determine the amount of nutrient pollution the Chesapeake Bay, and the waters flowing to it, may receive and still meet water quality standards. The TMDL does not just set pollution limits, but outlines the regulatory groundwork that all states with waters draining to the Chesapeake must follow. Voluntary efforts here in Pennsylvania have not worked. Now the federal Environmental Protection Agency (EPA) has a say in allocating how much pollution each source – point and nonpoint sources – from each state can contribute in order to restore the Bay and its tributaries to meet water quality standards. The EPA is on schedule to issue the Bay-wide TMDL by December 2010 with implementation beginning in early 2011.

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<sup>1</sup> Chesapeake Bay Program (2009). Bay Barometer: A Health and Restoration Assessment of the Chesapeake Bay and Watershed in 2008. Accessed June 2009 from [http://www.chesapeakebay.net/content/publications/cbp\\_34915.pdf](http://www.chesapeakebay.net/content/publications/cbp_34915.pdf).

<sup>2</sup> Chesapeake Bay Program (2009). 2011 Milestones for Reducing Nitrogen and Phosphorus. Accessed June 2009 from [http://archive.chesapeakebay.net/pressrelease/EC\\_2009\\_allmilestones.pdf](http://archive.chesapeakebay.net/pressrelease/EC_2009_allmilestones.pdf).

## **Summary of Key Findings**

The Nutrient Management Program, Pennsylvania's primary regulatory program, designed to control pollution from livestock operations does not adequately protect water quality in the Octoraro watershed from agricultural pollution. Manure continually overloads the watershed. Additionally, regulatory agency responsible for ensuring that livestock facilities comply with the laws conduct too few inspections to ensure the programs are fully implemented to protect water quality. Key findings include:

### **A significant number of livestock operations are not in compliance with their nutrient management plans**

- Only 57 percent of operations are compliant with their nutrient management plans.
- Seventeen percent are noncompliant and compliance of 26 percent of operations could not be determined due to incomplete files or lack of compliance review documents from the county conservation districts.

### **A significant number of the largest livestock operations are out of compliance with program requirements, and DEP's regulatory oversight is compromised by too few inspections.**

- 23 of 54 facilities in the watershed are Concentrated Animal Feeding Operations (CAFOs).
  - 16 of the 23 CAFOs are compliant with their nutrient management plans.
  - Two of the CAFOs are noncompliant.
  - The compliance of five operations could not be determined.
- 13 of the 23 CAFO facilities have been inspected by DEP.
  - Three are in violation of their National Pollutant Discharge Elimination System (NPDES) CAFO permits.
  - Only 10 CAFOs are in full compliance with their nutrient management plans and NPDES CAFO permit.
- Fifty-seven percent of CAFOs are in violation of the plans, permits, or lack proper review and/or inspection evidence to make a determination about compliance.

**Even though the number of livestock operations has decreased, significantly more manure and nutrients are being generated in the watershed.**

- There has been a **40 percent increase in the amount of liquid manure generated** as compared to the amount generated in 2004. 107,539,008 gallons of liquid manure are generated each year, enough liquid manure to fill more than 13,000 milk tanker trucks.
- There has been a **17 percent increase in the amount of dry manure generated** since 2004. 68,511 tons of dry manure are generated each year, equal in weight to more than 30,000 Ford Explorers.
- There has been more than a **20 percent increase in total nitrogen** produced in the watershed since 2004. A total of 3,398,733 pounds of nitrogen are generated from animal manure each year. The amount of nitrogen generated from animal agriculture in the watershed is equivalent to the amount of nitrogen generated annually by 371,446 humans, or a city 6.5 times the size of Lancaster.
- There has been a significant increase in manure storage capacity. Liquid manure storage capacity in the watershed is 61,210,531 gallons. This is sufficient manure storage capacity to hold 57 percent of all liquid manure produced in the watershed.
- There are 54 livestock operations in the watershed with approved nutrient management plans. This is a decrease of 10 operations since 2004.

**Most of the manure and nutrients generated in the watershed are disposed of in the watershed.**

- Nearly all (99 percent) of all liquid manure produced, 105,937,008 gallons, is used on fields within the Octoraro watershed. 91,761,686 gallons of liquid manure are applied on the agricultural operations that produce the manure.
- 97 percent of all dry manure produced, 66,263 tons, is used on fields within the Octoraro watershed. 43,204 tons of dry manure is used on the agricultural operations that produce the manure.
- 70 percent of livestock operations export some quantity of manure to brokers or other operators.
- 84 percent of operations that export manure send it to another location within the Octoraro watershed.
- 3,237,971 pounds of nitrogen (95 percent of all nitrogen produced) stays within the Octoraro watershed. This is equivalent to the amount of nitrogen generated annually by 353,877 people.

**Exceptional value and high quality streams are threatened by the overload of manure and nutrients, and nutrient overloads are unabated in streams already impaired by agricultural pollution.**

- 26 operations generating a total of 61,021,190 gallons of liquid manure (57 percent of all liquid manure produced) and 46,998 tons of dry manure (69 percent of all dry manure produced) are located in high quality or exceptional value watersheds. These 26 operations also produce 1,973,523 pounds of nitrogen or 58 percent of the total. This is equivalent to the amount of nitrogen generated annually by 215,685 people.
- 13 of the 26 (50 percent) facilities in special protection waters are located in stream segments also impaired by agricultural pollution due to excess nutrients and sediment.
- A total of 23 of the 54 operations (43 percent) are sited in drainage areas containing stream segments impaired by agricultural pollution. These operations produce 1,979,992 pounds of nitrogen or 58 percent of the total nitrogen generated. This is equivalent to the amount of nitrogen generated annually by 216,392 people. Sixty-two percent stays directly on the operations producing the manure.

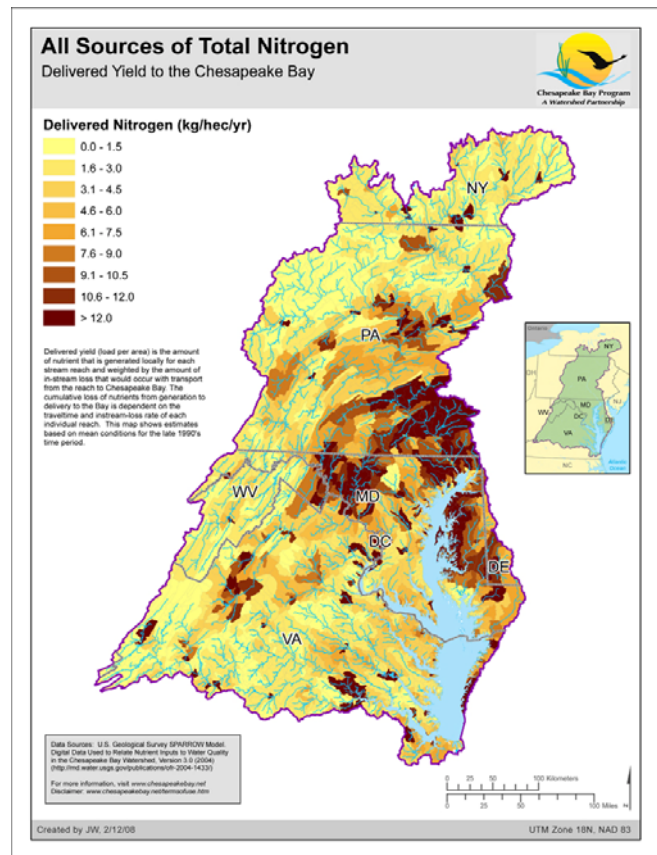
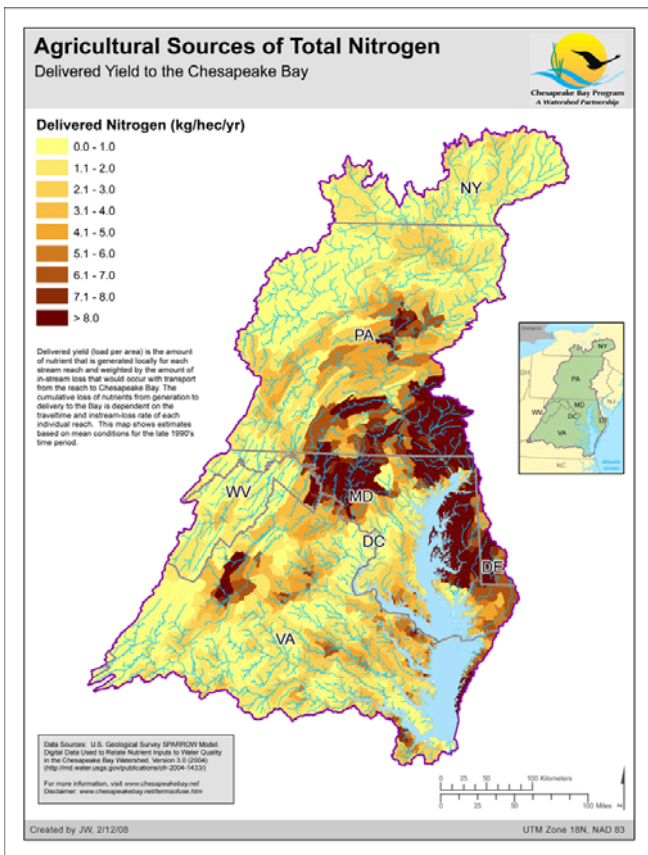
# Still Out of Balance:

## A follow-up study of the health of the water and land of the Octoraro watershed

### Introduction

The Octoraro watershed is located in the lower Susquehanna River basin (7-K of the State Water Plan). The watershed spans portions of Chester and Lancaster Counties and continues over the Maryland border. The watershed covers 208 square miles, 176 of which are in Pennsylvania. Of Pennsylvania's portion of the watershed, agriculture and related purposes use over 75 percent of the land, causing grave concerns over nitrogen pollution, due to the sheer volume of manure produced and used within the watershed. As the report shows, livestock in the watershed are generating almost 3.4 million pounds of nitrogen, most of which is spread on nearby farm fields.

Although nitrogen and phosphorous occur naturally, in high concentrations they become pollutants. Excess nutrient pollution causes massive algae blooms in rivers and water bodies. When the algae die and decompose, they consume oxygen in the water, creating dead zones that cannot support aquatic life – a threat all too common in the Chesapeake Bay. The maps below illustrate the delivered yields of nitrogen to the Bay from all sources and specifically from agriculture. The Octoraro sub-basin is located along the eastern edge of the greater Chesapeake Bay watershed. As these maps illustrate, the agricultural activities within the Octoraro watershed contribute a substantial amount of nitrogen to the Chesapeake Bay.



Maps courtesy of Chesapeake Bay Program<sup>3</sup>

<sup>3</sup> Chesapeake Bay Program (2008). Nutrients - Maps. Accessed June 2009 from <http://www.chesapeakebay.net/maps.aspx?menuitem=15220>.

## **Pennsylvania's Regulatory Programs**

Pennsylvania's Nutrient Management Program and Concentrated Animal Feeding Operation (CAFO) program are the primary regulatory programs designed to control nutrient pollution from agriculture. The programs attempt to limit nutrient pollution to waters of the Commonwealth primarily by limiting the loss of manure from fields where it is applied.

### **Nutrient Management Program**

The Nutrient Management Program is a water quality protection program overseen by the State Conservation Commission (SCC). Funding and oversight of the SCC comes jointly from the Pennsylvania Department of Agriculture (PDA) and Pennsylvania Department of Environmental Protection (DEP). Each agricultural facility in Pennsylvania surpassing a specific threshold of animal weight per acre is required to have a nutrient management plan (NMP). The plans detail the type of animals on an operation, amount of manure generated, how manure will be stored, and when and how manure will be disposed of. The plans attempt to ensure manure is spread to maximize its fertilizer value to crops and prevent excess fertilizer, chocked full of nitrogen and phosphorus, from running off the land and into waterways. The program does not necessarily prevent water pollution, even if manure storage and/or spreading is conducted in accordance with the plan.

Because the Octoraro watershed encompasses land in both Chester and Lancaster Counties, the Chester County Conservation District and the Lancaster County Conservation District are both involved in the administration of the nutrient management program for livestock operations in the watershed. There are a total of 54 livestock operations with a nutrient management plan in the watershed – 14 in Chester County, 39 in Lancaster County and one that straddles the county line.

There are three main reasons why a facility would have a nutrient management plan.

- If it is classified under Act 38 of 2005 as a concentrated animal operation (CAO).<sup>4</sup> Fifteen of the 54 farming operations in the watershed with a NMP fall into this category.

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<sup>4</sup> The nutrient management regulations, 25 Pa. Code 83.201, define a CAO as an agricultural operation with eight or more animal equivalent units where the animal density exceeds two animal equivalent units per acre on an annualized basis.

- If an operator volunteered to participate in the nutrient management program as a voluntary animal operation (VAO). Sixteen operations in the watershed are VAOs. This voluntary agreement affords nuisance protection, access to funding, and better on-the-ground management. Unfortunately, two of the three VAOs that dropped out of the program since 2004 were noncompliant with their plans.
- If it is large enough to be classified as a concentrated animal feeding operation (CAFOs). All CAFOs are required to have a NMP as a prerequisite to obtaining a National Pollutant Discharge Elimination System (NPDES) CAFO permit from DEP. Of the 54 operations in the watershed with a NMP, 23 are large enough to classify as CAFOs.

### **Concentrated Animal Feeding Operations**

The CAFO program is a water quality program administered by DEP as part of the federal NPDES program. CAFOs are facilities housing large quantities of livestock inside buildings or on confined feedlots. A CAFO is an animal feeding operation that meets any one of the following criteria:

- has greater than two animal equivalency units (AEUs)<sup>5</sup> per acre and has at least 300 AEUs in total (see *Chart 1* to understand the quantity of animals needed to equal 300 AEUs);
- has more than 1000 AEUs regardless of density; or
- exceeds a threshold established by the Environmental Protection Agency (see *Chart 2* for federal thresholds).

Again, 23 facilities in the watershed meet the above criteria and are required to have both a NMP and a CAFO permit.

The CAFO program's goal is water quality protection – both groundwater and surface water. The permitting process evaluates the whole farm's potential impacts on water quality. DEP considers the impacts of the land application of manure, manure storage facilities, silage areas, and dead animal composting areas. The CAFO program bans agricultural operations permitted by DEP from “discharging” pollutants to waters of the Commonwealth. A “discharge” means a direct discharge to surface waters or land application in excess of what an approved Nutrient Management Plan allows.

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<sup>5</sup> An AEU consists of 1,000 pound of live animal weight per acre.

**Chart 1: Number of Animals Needed to Equal 300 and 1,000 Animal Equivalent Units<sup>6</sup>**

<b>Animal Type</b>	<b>Number of Animals to Equal Approximately 300 AEUs</b>	<b>Number of Animals to Equal Approximately 1,000 AEUs</b>
Beef cattle	300 slaughter and feeder cattle	1,000 slaughter and feeder cattle
Dairy cattle (milked or dry)	200 mature dairy cattle	700 mature dairy cattle
Swine (approx. 55 lbs)	750 swine	2,500 swine
Sheep	3,000 sheep or lambs	10,000 sheep or lambs
Horses	150 horses	500 horses
Chickens (continuous flow watering system used)	30,000 laying hens or broilers	100,000 laying hens or broilers
Chickens (liquid manure system used)	9,000 laying hens or broilers	30,000 laying hens or broilers
Turkeys	16,500 turkeys	55,000 turkeys
Ducks	1,500 ducks	5,000 ducks

**Chart 2: Federal threshold criteria for operations requiring a NPDES CAFO permit**

<p>Concentrated animal operation (CAO) with greater than 300 AEUs</p> <p>Any agricultural operation with greater than 1,000 AEUs</p> <p>700 mature dairy cows, whether milked or dry</p> <p>1,000 veal calves</p> <p>1,000 cattle other than mature dairy cows or veal calves. Cattle includes but is not limited to heifers, steers, bulls and cow/calf pairs</p> <p>2,500 swine each weighing 55 pounds or more</p> <p>10,000 swine each weighing less than 55 pounds</p> <p>500 horses</p> <p>10,000 sheep or lambs</p> <p>55,000 turkeys</p> <p>30,000 laying hens or broilers, if the animal feeding operation uses a liquid manure handling system</p> <p>125,000 chickens (other than laying hens), if the animal feeding operation uses something other than a liquid manure handling system</p> <p>82,000 laying hens, if the animal feeding operation uses something other than a liquid manure handling system</p> <p>30,000 ducks if the animal feeding operation uses something other than a liquid manure handling system</p> <p>5,000 ducks if the animal feeding operation uses a liquid manure handling system</p>
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<sup>6</sup> Becker, J., et al., 2000. *A Guidebook on Community Participation in Addressing Disputes over Intensive Livestock Operations*. Harrisburg, PA: Pennsylvania Department of Agriculture, p.49-50.

## **Report Evaluation Method**

In order to evaluate individual farm compliance with the nutrient management and NPDES CAFO permitting programs, PennFuture conducted file reviews at the Chester and Lancaster County Conservation Districts and the southeastern and south-central regional offices of the DEP. PennFuture requested the files of all livestock operations within the Octoraro watershed including those of CAFOs, CAOs, and VAOs. The review analyzed all NMPs and CAFO permits in the watershed, revealing that many operations were out of compliance with their plans and in violation of their permits. Land disposal of manure and nutrients in the Octoraro watershed continues to increase despite such infractions, making it impossible to meet the mandated reductions to curb nutrients from entering our local waterways and flowing to the Bay. Compliance with NMPs and CAFO permits is a necessary first step toward restoring the Bay.

## **Manure and Nitrogen in the Watershed**

NMPs require a site-specific evaluation of the agricultural operation's farming practices to determine when, where, and how to apply manure. The mathematical calculations required in developing a NMP help the farm operator meet the nutrient needs of the crops and attempt to limit the off-site migration of nutrients from manure and fertilizer.

Nitrogen and phosphorus are the two nutrients that are of particular concern in Pennsylvania's nutrient management program. Excessive amounts of nitrogen or phosphorus in waterways can cause eutrophication, which is an increase in plant growth and decay leading to a lack of oxygen and reductions in fish and other animal populations. Generally, phosphorus is the nutrient that fuels eutrophication in streams and lakes in Pennsylvania. However, nitrogen is the nutrient responsible for eutrophication in the Chesapeake Bay. Because Pennsylvania's nutrient management program seeks to protect both the state's streams and lakes, and the greater watershed of the Chesapeake Bay, the program must be concerned with both nitrogen and phosphorus loading to local watersheds that will ultimately drain to the Bay.

Nitrogen is generally considered to be the more mobile of the two nutrients, so all NMPs must balance nutrient applications (manure, generally) with the nitrogen needs of the crop. The less mobile of the two nutrients is phosphorus. In limited circumstances, nutrient applications are restricted to the phosphorus needs of the crop planted or prohibited all together. However, existing CAOs, VAOs and importers of manure are not fully required to consider phosphorus until December 31, 2010, thus it was not possible to determine how much phosphorus is produced by agricultural operations in the watershed.

The aim of the nutrient management planning process is to ensure that no more manure nutrients are applied to crops than the crops can use, so that nutrients

and excess nitrogen and phosphorus are not running off into the nearest waterway or infiltrating into groundwater. However, only a relatively small percentage (15-20 percent) of the total nutrients in manure is available to a crop for use in the growing season the manure is applied. This leads to a large portion of the nutrients in manure lost, or potentially lost, to the environment. When a significant number of operations in one watershed operate under contract with large integrators requiring them to import feed instead of using locally grown crops, a one-way transfer of nutrients in excess of what the land and crops can assimilate occurs.<sup>7</sup> This leaves us with a watershed out of balance and overloaded with manure.

When an operation produces more manure than the crops it grows can use, manure must be exported off site. Seventy percent of operators in the watershed export some amount of manure to brokers or other farm operators. Importing operations are not required to have an approved nutrient management plan, but must balance the nitrogen needs of the crops grown with the nitrogen in the manure that is imported. Only about 5 percent of the nitrogen produced is exported outside the watershed, most of it to a mulch broker for use in mushroom operations.

An aggressive effort to reduce nutrient pollution by state and local agencies and private organizations has been frustrated by the growing amount of manure and nitrogen that is produced and remains in the watershed. Our review showed that the amount of manure and nitrogen in the watershed is significantly higher than 2004 levels. The amount of liquid and dry manure has increased 40 percent and 17 percent, respectively. From facilities with approved NMPs, 107,539,008 gallons of liquid manure and 68,511 tons of dry manure are generated each year. This is a total of 3,398,733 pounds of nitrogen each year. The amount of nitrogen generated from farming operations with a NMP in the watershed is equivalent to the amount of nitrogen generated annually by 371,446 humans, or a city 6.5 times the size of Lancaster.

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<sup>7</sup> Nord, E.A. and L.E. Lanyon. 2003. *Managing material transfer and nutrient flow in an agricultural watershed*. Journal of Environmental Quality, March/April 2003.

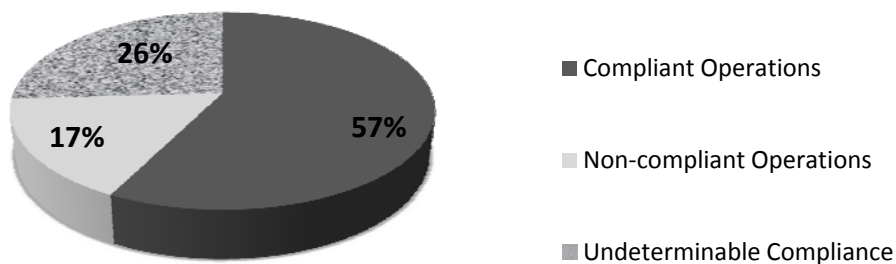
Analysis of the exporter/importer agreements shows that the majority of “exported” manure actually remains within the watershed. A total of 105,937,008 gallons of liquid manure is spread on fields within the Octoraro watershed. This accounts for 99 percent of all liquid manure produced. A total of 66,263 tons of manure is spread on fields within the watershed. This accounts for 97 percent of all dry manure produced. Overall, total nitrogen produced from liquid and dry sources – 95 percent or 3,237,971 pounds– is staying within the watershed.

### **Implementation of the Nutrient Management Program**

County Conservation Districts attempt to balance their role in monitoring compliance status with their role of providing technical and educational assistance to agricultural operations. Reviewing NMPs to ensure proper plan implementation is a critical task of the Conservation District. Inspections of CAOs must occur every year and VAO inspections must occur at least once every three years. Inspections by the conservation districts assess whether or not a plan needs revising to account for any changes in the agricultural operation, and attempt to ensure that the nutrient management program is properly implemented. However, they have no authority to require compliance with the plans or cite operations for plan violations. Only the most egregious offenders are referred to the State Conservation Commission for enforcement action.

Despite the efforts of the Chester and Lancaster County Conservation Districts, only 57 percent of operations are compliant with their nutrient management plans. Seventeen percent were non-compliant and compliance of 26 percent of operations could not be determined due to incomplete files or lack of compliance review documents from the County Conservation Districts.

### **Nutrient Management Plan Compliance Status**



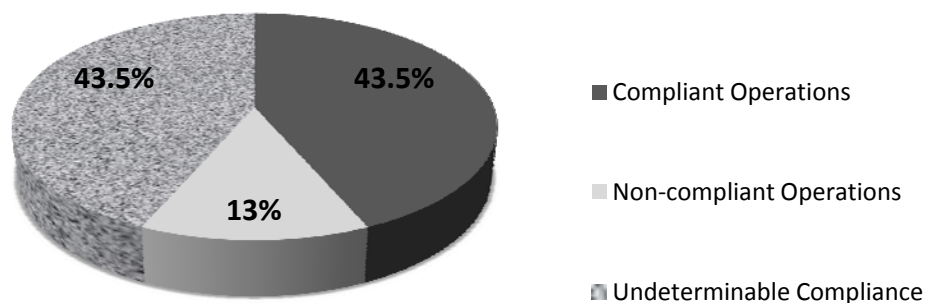
## **Concentrated Animal Feeding Operations in the Watershed**

Of the 54 livestock operations in the Octoraro watershed, 23 operations are large enough to be regulated as CAFOs. A CAFO is required to have a water pollution control permit from DEP.

These 23 operations generate well over 60 percent of the total manure and over 70 percent of the total nitrogen produced. That is more than 70 million gallons of liquid manure and more than 40,000 tons of dry manure. This manure contains almost 2.5 million pounds of nitrogen, equivalent to the amount of nitrogen generated annually by 273,224 people.

Only 16 of the CAFOs in the watershed are compliant with their nutrient management plans. Two were clearly noncompliant with their nutrient management plans and the compliance status of five could not be determined because there was not a record of inspection. DEP inspected only 13 of the 23 operations. Federal law requires these facilities to be inspected by DEP at least once every five years; however, PennFuture understands that DEP attempts to inspect these facilities more often. Of the 13 inspected operations, three were in violation of their NPDES CAFO permit. Four did not have evidence of any conservation district review or DEP inspection. Ultimately, only 10 CAFOs are in full compliance with nutrient management plans and inspected by DEP. Fifty-seven percent of CAFOs are in violation of the plans, permits, or lack proper review and/or inspection evidence to make a determination about compliance.

### **NPDES CAFO Permit Compliance Status**



## **Impaired Watersheds**

Unfortunately, a number of streams and stream segments in the Octoraro watershed do not meet water quality standards due to nutrient and sediment pollution. Twenty-three of the 54 operations are sited in stream segments containing waters impaired by agricultural livestock pollution. These operations produce almost 2,000,000 pounds of nitrogen or 58 percent of the total nitrogen generated. Over 60 percent of the nitrogen generated in the watershed stays directly in operations that are located in areas of impaired waters.

DEP does not attempt to limit the manure generated or disposed on land in impaired waters regardless of the size of a facility or quantity of manure produced. There is no consideration for the cumulative impact of manure and nitrogen generated when evaluating new or expanding CAFO facilities. CAFO permits are “non-discharge” permits. However, under some circumstances, such as large storm events, discharges do occur. This occasional discharge is minimal compared to the routine loss of nutrients to the environment, estimated at 75-80 percent, due to the inefficient use of nutrients by crops. Virtually all regulatory programs ignore these losses and fail to consider this when permitting operations in areas with impaired waters or when designing a TMDL.

## **Special Protection Watersheds**

Twenty-six facilities, or 48 percent of the operations, are located in watersheds of special protection. Waters designated as high quality (HQ) and exceptional value (EV) receive the highest water quality protection in the Commonwealth. These 26 facilities generate more than 60 million gallons of liquid manure and more than 46,000 tons of dry manure. The manure contains almost 2 million pounds of nitrogen. Sixty-two percent of this produced manure is disposed on land in special protection watershed segments.

Half of these high quality waters also contain stream segments impaired by agricultural runoff due to excess nutrients and sediment.<sup>8</sup> Under current law, DEP allows the construction of new CAFOs and expansion of existing facilities in special protection watersheds. An antidegradation analysis is required of all point source discharges and requires applicants for a new or increased discharge to special protection waters. The goal of the analysis is to prevent any decrease in water quality that might occur because of the new or increased wastewater discharges. Agricultural operations are exempt from the requirement to complete an antidegradation analysis.

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<sup>8</sup> Pennsylvania Department of Environmental Protection (2009). Total Maximum Daily Loads. Accessed June 2009 from [http://www.dep.state.pa.us/watermanagement\\_apps/tmdl/](http://www.dep.state.pa.us/watermanagement_apps/tmdl/).

## **Winter Spreading**

The nutrient management program does not outright ban spreading manure on frozen or snow-covered ground, even though the ground is frozen and unable to assimilate nutrients because plants are not growing and using nutrients during the winter months. Spreading manure in fields during the winter is disposal of a waste with no crop fertilizing benefit. During the winter, precipitation or a quick melt can easily wash nutrients directly into waterways.

Ideally, farming operations should have the capacity to store manure over the winter months and spread it on fields during times of the year when crops can absorb nutrients in the manure. Liquid manure storage capacity in the watershed is currently 61,210,531 gallons. This is a significant increase in manure storage from 2004. In fact, the watershed now has the manure storage capacity to hold 57 percent of all the liquid manure produced. This indicates storage capacity is on the rise and the need for winter spreading is decreasing.

## **Conclusions**

The finding of this report that there has been a significant increase in the generation of manure and nutrients in the Octoraro watershed is staggering in light of the commitments made by Pennsylvania to reduce the nitrogen and phosphorus loads to the Bay by 2011.

Pennsylvania has assumed responsibility for 46.2 percent of the total nitrogen load reductions required by 2011. This amounts to a total load reduction of 7,300,000 pounds of nitrogen originating from Pennsylvania. To reach this obligatory goal, 58 percent of that nitrogen load reduction will have to come from changes in agricultural practices.

Additionally, Pennsylvania has committed to reducing 28.5 percent of the total phosphorus load to the Bay by 2011. This amounts to a total load reduction from Pennsylvania of 300,000 pounds. To reach this goal, 65 percent of the load reduction will have to come from changes in agricultural practices.

**While Pennsylvania has made significant commitments to reduce the discharge of pollutants to the Bay, the Commonwealth will be unlikely to meet these goals if the agricultural trends seen over the past five years in the Octoraro watershed continue throughout Pennsylvania's portion of the Bay watershed.**

The nutrient load to the Octoraro watershed is increasing. While innovative programs such as the nutrient trading program are working toward reducing the greater nutrient load to the Bay, these reductions are also attributable to other sectors such as sewage treatment facilities. Nutrient load reductions directly attributable to agricultural operations must be required.

Currently there is a disconnect between the programs that permit the siting and operation of agricultural operations, the nutrient management program and NPDES CAFO permitting program, and the cleanup program, the TMDLs, that are supposed to bring polluted streams into attainment with water quality standards. Because the permitting programs allow increases in the generation of nutrients in impaired watersheds, the potential for a TMDL to actually reduce nutrient loadings is fundamentally compromised. In impaired watersheds, the Commonwealth must require agricultural operations that will increase the amount of manure and nutrients generated to implement innovative practices that would result in no additional discharge of manure or nutrients to local waters, and ultimately the Bay.

The nutrient management program and NPDES CAFO permitting program are not adequately ensuring water quality protection in the Octoraro watershed. In

the past five years, manure and nitrogen in the watershed have increased without a corresponding increase in program enforcement to verify proper implementation of NMPs or NPDES CAFO permits. Without boots on the ground, such documents are nothing more than paper exercises. The looming federal cleanup plan, the TMDL, must be more than a paper exercise. It must require enforceable reductions from the agricultural sector. If it does not, we are once again setting up the cleanup effort to fail. And the people who live in the Octoraro and Chesapeake Bay watersheds cannot afford that.

## **Recommendations**

### **To achieve better implementation and enforcement of current regulations**

- DEP should require any new or expanding CAO or CAFO to maintain manure storage capacity sufficient to contain the manure for six months.
- County Conservation Districts need to improve on-site status reviews of VAOs. Districts should work to bring VAOs into compliance prior to their opting out of the nutrient management program. Nuisance protection cannot be provided and funding cannot be distributed to VAOs unless the compliance status of an operation is clear. If the operations of a VAO pose an actual or potential threat of polluting water, DEP must receive notice before the facility is allowed to opt out of the program.
- DEP should consider the cumulative impact of agricultural operations in impaired watersheds and the intent of TMDLs when approving NPDES CAFO permits. No additional pollution load should be permitted unless a nutrient offset option or on-site technology exists to demonstrate that there will be no additional degradation of a waterway. An antidegradation analysis must demonstrate that no new waste load will diminish the quality of a waterway.
- DEP should require CAOs and CAFOs in special protection watersheds (HQ/EV) to review and satisfy all antidegradation program requirements.
- DEP must ensure reasonable compliance schedules and enforceable allocations are included in the TMDL.
- DEP must provide reasonable assurances that nonpoint source reductions, including the two-year milestones, are reached within a reasonable timeframe and with a margin of safety.
- SCC needs to ensure on-site inspection/status reviews happen in a timely manner. Conservation Districts should submit annual reports indicating the name and the corresponding compliance status of each operation. Conservation Districts should indicate any facilities that were not inspected and why. The SCC needs to ensure that conservation districts are meeting the inspection requirements of their delegation agreements.
- DEP and County Conservation Districts must ensure that all farms comply with the terms of the *Manure Management for Environmental Protection* manual (25 PA Code § 91.36(b) (1) (i)) and PA Clean Streams Law. Although there are 30,000 farms in the Bay watershed, only 2,700 farms in Pennsylvania have a NMP. The agencies must work to ensure that even small farms do not pose a threat to water quality.
- DEP must ensure that all participating operations meet baseline compliance in order to make the Nutrient Credit Trading Program a viable tool to help meet water quality goals.

- If Pennsylvania fails to meet its milestones for progress, the EPA should restrict or prohibit the issuance of new point source permits and reconsider DEPs authority in regulating nonpoint sources.

### **Policy Recommendations**

- Prohibit manure spreading on frozen or snow-covered ground. In extreme circumstances, such as a manure storage overflow, manure spreading should only be allowed with prior approval from the County Conservation District or DEP. Fields receiving manure must have an appropriate cover crop to reduce manure runoff. Otherwise, excess manure must be transported to a sewage treatment facility or regional digester.
- Manure spreading should not occur within 100 feet of any wetland or waterway, intermittent or otherwise, unless a 35 foot vegetated buffer exists.
- Mandate a reporting requirement that Conservation Districts must make public a record of all facilities inspected each year and the corresponding compliance status of each. The report should be submitted to the SCC, DEP, and open for public inspection.
- Support funding for research on ways to improve nutrient availability to crops in the year manure is applied.
- Support funding for research on technologies that either reduce nutrient content of manure or provide alternative uses for manure.
- Support funding to ensure water quality programs are sufficiently maintained through staff and resources. Prevent staff cuts to DEP and County Conservation Districts in the face of declining revenue and budgets.
- The law states that NMPs, NPDES CAFO permits, inspection notes, and compliance letters are public documents. Artificial roadblocks cannot be constructed to discourage public participation. Conservation Districts and the DEP must grant access to public files in a timely and respectful manner.



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